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(54) **MULTI-MEDIA BROADCAST AND
MULTICAST SERVICE (MBMS) IN A
WIRELESS COMMUNICATION SYSTEM**

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USPC **370/321; 370/314; 370/337; 370/442; 455/503; 455/464**

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,901,307 A 2/1990 Gilhousen et al.
4,907,307 A 3/1990 Weitzler

(Continued)

FOREIGN PATENT DOCUMENTS

CN 1194748 A 9/1998
CN 1196845 A 10/1998

(Continued)

OTHER PUBLICATIONS

International Search Report, PCT/US2003/014079—International Search Authority—European Patent Office, Jun. 14, 2004.

(Continued)

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(57) **ABSTRACT**

Techniques to implement MBMS services in a wireless communication system. In one aspect, a method is provided for processing data for transmission to a plurality of terminals. Frames of information bits (which may have variable rates) are provided to a buffer implementing a matrix. The matrix is padded with padding bits based on a particular padding scheme to support variable frame rates. The frames are then coded based on a particular block code to provide parity bits. The frame of information bits and the parity bits are then transmitted to the terminals. In another aspect, a method is provided for controlling the transmit power of a data transmission to a plurality of terminals. In accordance with the method, TPC streams are received from the terminals and processed to obtain a stream of joint power control commands used to adjust the transmit power of the data transmission.

10 Claims, 13 Drawing Sheets

